CHAPTER IV - SUMMARY OF SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

1. GENERAL

The JTWC area of responsibility (AOR) was expanded on 1 October 1980 to include the southern hemisphere from 180° longitude westward to the east coast of Africa. Details on tropical cyclones in this region for July 1980 to June 1982 are contained in Diercks et. al. (1982). For the July 1982 through June 1984 period, reference the NOCC/JTWC TECH NOTE 86-1. As in earlier reports, data on tropical cyclones forming in, or moving into, the South Pacific Ocean east of 180° longitude (NWOC's AOR) are included for completeness. JTWC provides the numbers for all South Pacific and South Indian Ocean tropical cyclones. The current convention (as stated in USCINCPACINST 3140.1S) for labelling tropical cyclones that develop in the South Indian Ocean (west of 135° East longitude) is to add the suffix "S" to the assigned tropical cyclone number, while those originating in the South Pacific Ocean (east of 135° East longitude) receive a "P" suffix. The "P" suffix also applies to significant tropical cyclones which form east of 180° longitude in the South Pacific Ocean. Also, it should be noted that to encompass the southern hemisphere tropical cyclone season, which normally occurs from January through April, the limits of each southern hemisphere tropical cyclone year are defined as 1 July to 30 June. Thus, the 1988 southern hemisphere tropical cyclone year is from 1 July 1987 to 30 June 1988. This is in contrast to the labelling convention in the northern hemisphere, which is based on the calendar year (1 January to 31 December) to include the seasonal activity from May through December.

2. SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

Twenty-one significant tropical cyclones (Table 4-1 and Figure 4-1) occurred during the year (1 July 1987 through 30 June 1988) in the southern hemisphere AOR. This was lower than the twenty year average of 24.7 (Table 4-2) and significantly lower than the short term (1981-1985) average (Annual Tropical Cyclone Report, 1987) of 28.6. Five tropical cyclones occurred in the South Pacific Ocean, east of 165° East longitude, which is very close to the long-term mean (Table 4-3). The Australian area (105° to 165° East longitude) accounted for only two tropical cyclones, compared to the twenty year climatological mean of 10.3 cyclones. Fourteen tropical cyclones developed in the South Indian Ocean, which is almost six more than the twenty year mean of 8.4 cyclones.

Caveat: Intensity estimates for southern hemisphere tropical cyclones are derived primarily from evaluation of satellite imagery (Dvorak, 1984) and from intensity estimates reported by other regional centers. Only in isolated cases are intensity estimates based on conventional surface observations. Estimates of minimum sea-level pressure are usually derived from the Atkinson and Holliday (1977) relationship between maximum sustained one-minute surface wind and minimum sea-level pressure (Table 4-4). This relationship has been shown to be representative for tropical cyclones in the western North Pacific and is also used by Australian region warning agencies to provide intensity estimates. However, these pressure estimates are usually based on wind intensities derived from interpretation of satellite imagery. Considerable caution should be exercised when using resultant pressure values in future tropical cyclone work.

TABLE 4-1

SOUTH PACIFIC AND SOUTH INDIAN OCEANS
1988 SIGNIFICANT TROPICAL CYCLONES

TROPICAL CYCLONE	PERIOD OF WARNING	NUMBER WARNINGS ISSUED	MAXIMUM SURFACE WINDS-KT (M/SEC)	ESTIMATED MSLP-MB
01S - - - -	01 NOV - 09 NOV	20	55 (28)	984
02S - - - -	24 NOV - 26 NOV	5	40 (21)	994
03S ARINY	09 DEC - 14 DEC	10	55 (28)	984
04P - - - -	22 DEC - 23 DEC	3	35 (18)	997
05S BERNANDRO	27 DEC - 01 JAN	11	35 (18)	997
06P AGI	06 JAN - 07 JAN	3	35 (18)	997
06P AGI *	09 JAN - 14 JAN	13	70 (36)	972
07P ANNE	07 JAN - 14 JAN	14	140 (72)	898
08S CALIDERA	13 JAN - 15 JAN	5	65 (33)	976
09S DOAZA	23 JAN - 26 JAN	7	55 (28)	984
09S DOAZA *	28 JAN - 02 FEB	11	115 (59)	927
10S FREDERIC	31 JAN - 02 FEB	6	65 (33)	976
11S GWENDA **	08 FEB - 16 FEB	16	90 (46)	954
12P CHARLIE	21 FEB - 24 FEB	9	45 (23)	991
12P CHARLIE *	28 FEB - 29 FEB	3	35 (18)	997
13P BOLA	24 FEB - 04 MAR	20	105 (54)	935
14S - - - -	27 FEB - 02 MAR	8	85 (44)	958
15P CILLA	28 FEB - 03 MAR	8	45 (23)	991
16S GASITAO	16 MAR - 23 MAR	16	130 (67)	910
17S - - - -	17 MAR - 20 MAR	7	45 (23)	991
18S HELY	27 MAR - 28 MAR	3	40 (21)	994
19P DOVI	09 APR - 15 APR	12	70 (36)	972
20S IARISENA	09 MAY - 10 MAY	3	40 (21)	994
21S - - - -	19 MAY - 20 MAY	4	35 (18)	995
	TOTAL	217		

* REGENERATED
** ALSO NAMED EZENINA

NOTE: NAMES OF SOUTHERN HEMISPHERE TROPICAL CYCLONES ARE GIVEN BY THE REGIONAL WARNING CENTERS (NANDI, BRISBANE, DARWIN, PERTH AND MAURITIUS) AND ARE APPENDED TO JTWC WARNINGS, WHEN AVAILABLE.

Figure 4-1

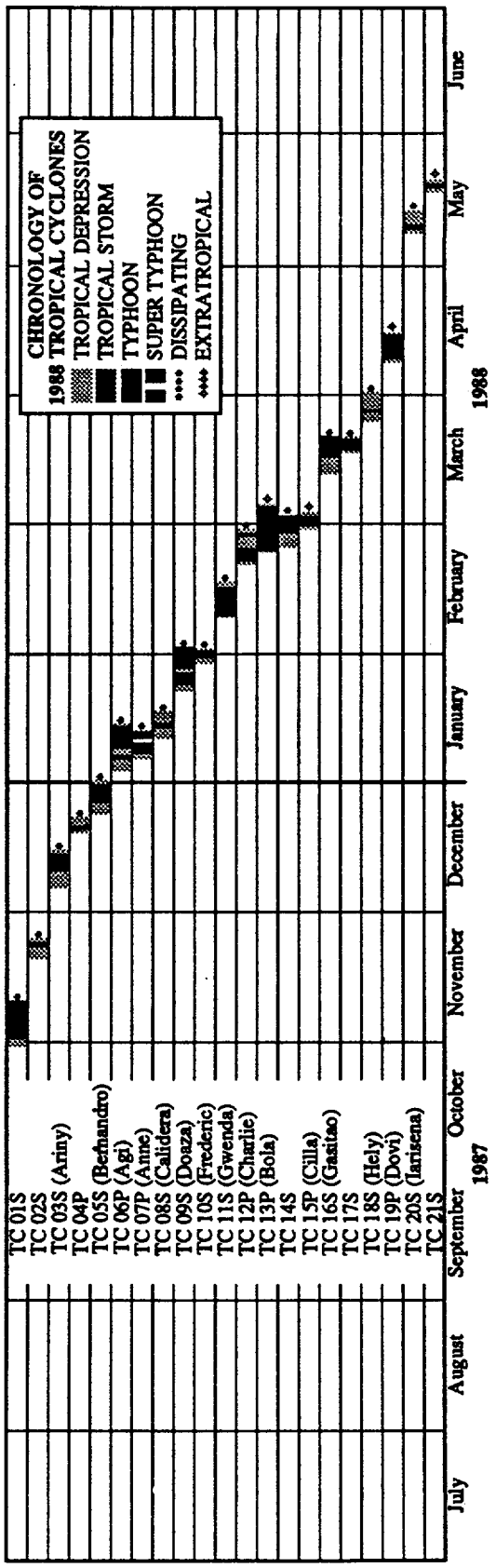

CHRONOLOGY OF
1988 TROPICAL CYCLONES
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON
DISSIPATING
EXTRATROPICAL
TC 01S
TC 02S
TC 03S (Ariny)
TC 04P
TC 05S (Bethandro)
TC 06P (Agi)
TC 07P (Anne)
TC 08S (Calidera)
TC 09S (Doaza)
TC 10S (Frederic)
TC 11S (Gwenda)
TC 12P (Charlie)
TC 13P (Bola)
TC 14S
TC 15P (Cilla)
TC 16S (Gastao)
TC 17S
TC 18S (Hely)
TC 19P (Dovi)
TC 20S (Iarisena)
TC 21S
July
August
September
October
November
December
January
February
March
April
May
June
1987
1988

TABLE 4-2

FREQUENCY OF TROPICAL CYCLONES BY MONTH AND YEAR
SOUTH PACIFIC AND SOUTH INDIAN OCEANS

YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
(1959-1978) AVERAGE*	-	-	-	0.4	1.5	3.6	6.1	5.8	4.7	2.1	0.5	-	24.7
1981	0	0	0	1	3	2	6	5	3	3	1	0	24
1982	1	0	0	1	1	3	9	4	2	3	1	0	25
1983	1	0	0	1	1	3	5	6	3	5	0	0	25
1984	1	0	0	1	2	5	5	10	4	2	0	0	30
1985	0	0	0	0	1	7	9	9	6	3	0	0	35
1986	0	0	1	0	1	1	9	9	6	4	2	0	33
1987	0	1	0	0	1	3	6	8	3	4	1	1	28
1988	0	0	0	0	2	3	5	5	3	1	2	0	21
(1981-1988) AVERAGE	0.4	0.1	0.1	0.5	1.5	3.4	6.8	7.0	3.8	3.1	0.9	0.1	27.7
TOTAL CASES	3	1	1	4	12	27	54	56	30	25	7	1	221

* (GRAY, 1979)

TABLE 4-3

ANNUAL VARIATION OF SOUTHERN HEMISPHERE
TROPICAL CYCLONES BY OCEAN BASIN

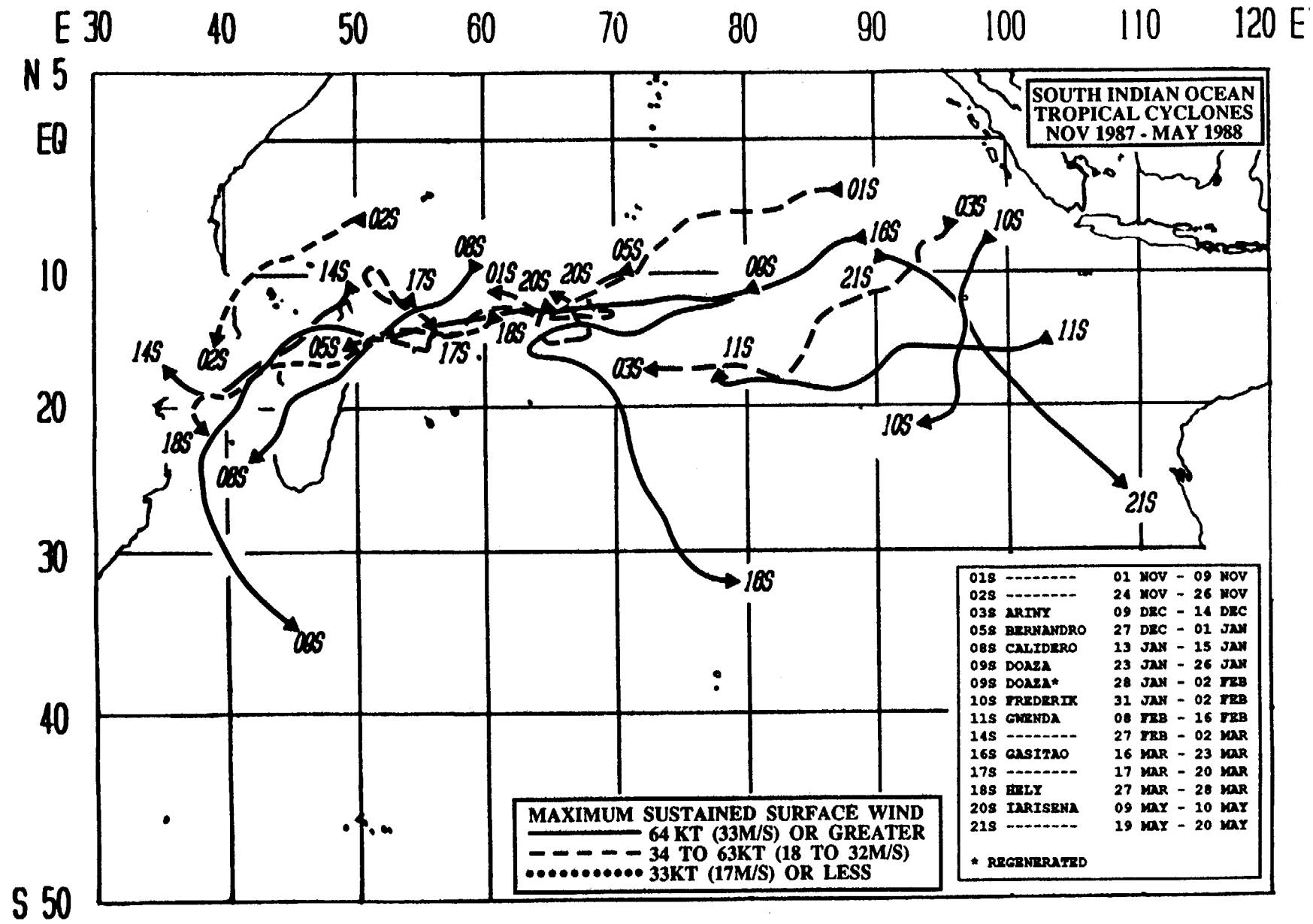
YEAR	SOUTH INDIAN (WEST OF 105° E)	AUSTRALIAN (105° E - 165° E)	SOUTH PACIFIC (EAST OF 165° E)	TOTAL
(1959-1978) AVERAGE*	8.4	10.3	5.9	24.7
1981	13	8	3	24
1982	12	11	2	25
1983	7	6	12	25
1984	14	14	2	30
1985	14	15	6	35
1986	14	16	3	33
1987	9	8	11	28
1988	14	2	5	21
(1981-1988) AVERAGE	12.1	10.0	5.5	27.6
TOTAL CASES	97	80	44	221

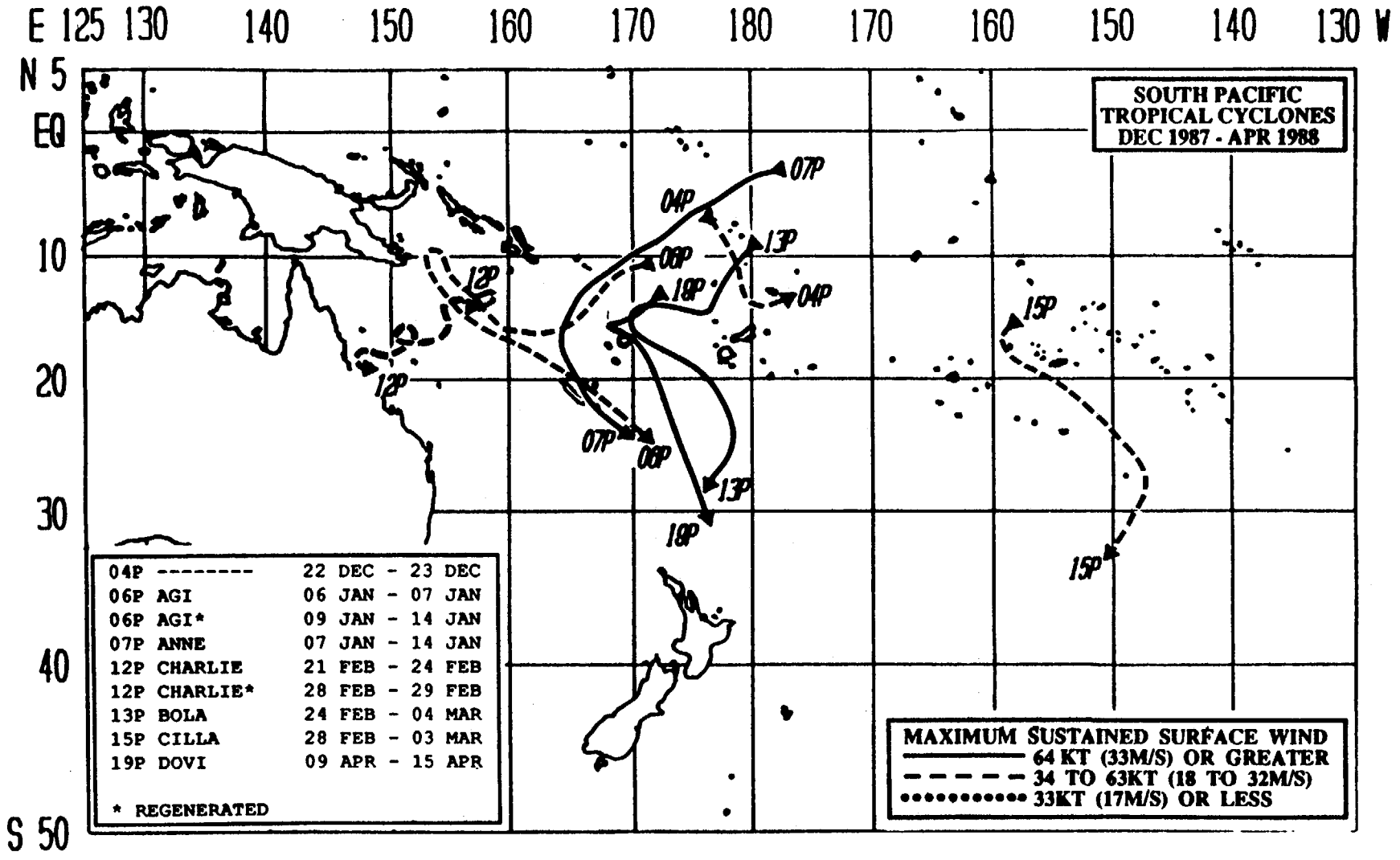
* (GRAY, 1979)

TABLE 4-4

MAXIMUM SUSTAINED SURFACE WINDS AND EQUIVALENT MINIMUM SEA-LEVEL PRESSURE (ATKINSON AND HOLLIDAY, 1977)

MAXIMUM SUSTAINED SURFACE WIND (KT)	MINIMUM SEA-LEVEL PRESSURE (MB)
30	1000
35	997
40	994
45	991
50	987
55	984
60	980
65	976
70	972
75	967
80	963
85	958
90	954
95	948
100	943
105	938
110	933
115	927
120	922
125	916
130	910
135	906
140	898
145	892
150	885
155	879
160	872
165	865
170	858


E 30
40
50
60
70
80
90
100
110
120 E
N 5
EQ
10
20
30
40
S 50
SOUTH INDIAN OCEAN
TROPICAL CYCLONES
NOV 1987 - MAY 1988
01S
02S
03S
05S
08S
10S
16S
21S
14S
17S
20S
11S
18S
09S
MAXIMUM SUSTAINED SURFACE WIND
64 KT (33M/S) OR GREATER
34 TO 63KT (18 TO 32M/S)
33KT (17M/S) OR LESS
01S -------- 01 NOV - 09 NOV
02S -------- 24 NOV - 26 NOV
03S ARINY 09 DEC - 14 DEC
05S BERNANDRO 27 DEC - 01 JAN
08S CALIDERO 13 JAN - 15 JAN
09S DOAZA 23 JAN - 26 JAN
09S DOAZA* 28 JAN - 02 FEB
10S FREDERIK 31 JAN - 02 FEB
11S GWENDA 08 FEB - 16 FEB
14S -------- 27 FEB - 02 MAR
16S GASITAO 16 MAR - 23 MAR
17S -------- 17 MAR - 20 MAR
18S HELY 27 MAR - 28 MAR
20S IARISENA 09 MAY - 10 MAY
21S -------- 19 MAY - 20 MAY
* REGENERATED


E 125 130 140 150 160 170 180 170 160 150 140 130 W
N 5
EQ
10
20
30
40
S 50
SOUTH PACIFIC
TROPICAL CYCLONES
DEC 1987 - APR 1988
04P -------- 22 DEC - 23 DEC
06P AGI 06 JAN - 07 JAN
06P AGI* 09 JAN - 14 JAN
07P ANNE 07 JAN - 14 JAN
12P CHARLIE 21 FEB - 24 FEB
12P CHARLIE* 28 FEB - 29 FEB
13P BOLA 24 FEB - 04 MAR
15P CILLA 28 FEB - 03 MAR
19P DOVI 09 APR - 15 APR
* REGENERATED
MAXIMUM SUSTAINED SURFACE WIND
64 KT (33M/S) OR GREATER
34 TO 63KT (18 TO 32M/S)
33KT (17M/S) OR LESS

Intentionally left blank.